Bakerian lecture of 1868, and the value of both was further recognised by the Royal Society by the subsequent award to him of a Royal Medal.

Other important work which has long since taken its due place in the literature of the science is his observations on the constitution of aqueous solutions of acids and his investigation on perchloric acid and its compounds.

Roscoe did a notable service to science by his action in making Bunsen and Kirchhoff's work on spectroscopy generally known in this country, and during the early 'sixties there were few of our larger towns in which he did not demonstrate by means of popular lectures the astonishingly interesting results of the then novel form of chemical analysis. His first lectures on the subject in London were republished in collected form, suitably illustrated, and the book had a considerable success and passed through several editions. He made, in addition, a number of original spectroscopic inquiries, the results of which appear in the publications of the Royal Society.

But the work by which he will continue to be known is the service he rendered to teaching by his many manuals of instruction, some of which were highly popular, ran through many editions, and were translated into a variety of languages. Of these the most important is the large treatise in which he co-operated with his former assistant and friend, Carl Schorlemmer, the first professor of organic chemistry in this country, a man of great erudition, and an able and well-informed chemist. No combination of workers could be more happily selected, for each, in a sense, was complementary to the other. Schorlemmer was the bibliographer, with quite a remarkable knowledge of chemical literature and an extraordinarily retentive and accurate memory, whilst Roscoe's gift of exposition and faculty of clear and simple statement and of systematic arrangement enabled all the accumulated wealth of facts to be set forth in an eminently attractive and readable form.

This appreciation is concerned more particularly with Roscoe as a teacher engaged in the pursuit of experimental inquiry, with which aspects of his career the writer may claim to have some right to speak from personal knowledge. It must be left to others to deal with his many other activities during the later years of his life, such as his political life, his work in regard to technical education, and in connection with the still unsolved problem of the true function of a great metropolitan university, and the important services he rendered to preventive medicine in his association with the Lister Institute.

T. E. THORPE.

NOTES.

SIR ARCHIBALD GEIKIE, O.M., K.C.B., F.R.S., will reach his eightieth birthday next Tuesday, December 28. He is in excellent health, and still busy with his pen.

WE announce with much regret the death on December 17, at seventy-five years of age, of Sir John Rhys, principal of Jesus College, Oxford, and professor of Celtic in the University. In addition to his other titles to distinction, Sir John Rhys was well known for his work in archæology and anthropology. He was president of the Anthropological Section of the British Association in 1900.

LORD ALVERSTONE, late Lord Chief Justice of England, whose death occurred on December 15, was a fellow of the Royal Society, having been elected in 1902 under a statutory provision, formerly in operation, which allowed of the election of Privy Councillors. He was a familiar figure at the society's annual soirées, and from time to time attended and spoke at the presidential anniversary banquets. Lord Alverstone had a long and traditional connection with the Royal Society of Arts, the son in this respect continuing the highly useful services rendered by his father, Mr. Thomas Webster, Q.C. Elected on the council in 1883, he was chairman of that body from 1890 to 1894, remaining afterwards an ordinary member of council for a long period of years. On King George's accession to the throne in 1910, the presidency of the society became, thereby, vacant, and the late Lord Chief Justice accepted the post. He resigned in 1911 in order to make way for his Royal Highness the Duke of Connaught. It may be recalled that Lord Alverstone opened the proceedings of the "Law, Political Economy, and Legislation Affecting Chemical Industry" Section of the International Congress of Applied Chemistry, held at South Kensington in 1909, giving a thoughtful address on the right method of legislating upon and dealing with scientific technical knowledge.

THE letters in the *Times* during the last few days from Mr. C. H. L. Alder, Sir William Ramsay, and Mr. J. A. Goudge again direct attention to a remarkable state of affairs. As recently pointed out in NATURE, Germany is necessarily suffering from a serious shortage of fats, and consequently of glycerine, which is obtainable from no other source. Notwithstanding our supposed blockade, Germany is making up for this shortage by the import, through neutral countries, of fats and oil-containing seeds. Though primarily produced abroad, the fatty materials to a large extent pass through British hands and British ports. In the correspondence referred to, disturbing statistics are given concerning linseed, which is one fatty material out of many. Sir William Ramsay shows by a simple calculation that from linseed oil alone our Government has furnished the enemy with no fewer than 18,000 tons of gun ammunition. Actually the position is much worse, and the additional complication is now arising that, owing in part to the general dislocation of transport, there is more than a possibility of a future shortage of fatty materials, and consequently of glycerine, in this country. The price of fats here is rising in an alarming manner, though since their cost is still small compared with that ruling in Germany, the financial temptations to export to neutral countries bordering on Germany remain immense. It is difficult to understand whether the present policy of the Government is due to want of knowledge or to reasons of high politics; if the former, we may justly ask what are the Government chemists and the scientific Advisory Committees doing to enlighten responsible authorities on this matter?

THE death is announced of two ex-directors-general of Indian Telegraphs. Mr. J. Horsburgh Lane, who was deputy-director-general in 1890, and officiating director-general in 1892, retired in 1894. He was the compiler of a "Word Code for Foreign Telegrams," and at the time of his death had reached the age of seventy-six years. The other Indian Telegraph Department official who has just died was Mr. F. Gurr Maclean, who was director-general from 1900 to 1903, when he retired. He died at Woking, aged sixty-seven years.

THE Government has decided that all medical students, except those in the two last years of professional study, are to relinquish their work and become combatant members of the Army. While it must be recognised that the interests of the community must be subservient to the military needs of the State, the heavy drains now being made on the medical reserves of the nation may well in the future bring about an acute shortage of medical men. As the *Morning Post* pertinently asks: What is going to happen if the war is prolonged, and few new medical men become available in the future? For under the present policy, after the end of 1916, no present students will become qualified except a few medically unfit for the Army. Altogether probably not more than 600 or 700 men are involved—a negligible contribution to the fighting forces of the Army—but a number which in four or five years' time would be of the greatest value in augmenting the then depleted medical service of the country. We are already suffering from a diminished birth-rate, an increasing death-rate, and an increased infant death-rate, and if the medical care of the community be lessened, as it inevitably will be if there are no fresh doctors, these evils will certainly increase. If these students could be made use of as dressers and attendants, and the time so occupied were allowed to count towards the time required for the medical curriculum, the difficulty would be partly met. The first and second year students should at least be relegated to so late a class in the reserved groups that their calling up will occur only in the case of the most desperate need.

DR. ORVILLE A. DERBY, whose death at Rio de Janeiro we reported last week, was one of the most active pioneers in the geology of Brazil, and did great service to science by the influence he was able to exert on the Brazilian Government. A pupil of Prof. C. F. Hartt, of Cornell University, whose well-known "Geology and Physical Geography of Brazil" was published in 1870, he followed in his teacher's footsteps, and in 1879 was appointed director of the Geographical and Geological Commission of the State of San Paulo. In 1906 he removed to Rio de Janeiro as director of the newly instituted Geological and Mineralogical Service of Brazil, and there remained full of activity until his last brief illness. Dr. Derby's first original paper was a notice of some Palæozoic fossils collected by A. Agassiz and S. W. Garman near Lake Titicaca, in 1876; and in the two following years he published in the Archives of the National Museum of Rio de Janeiro important memoirs on the geology of the Lower Amazons and the neighbourhood of Bahia. In 1878 he also described the diamond-bearing region of Paraná, and in later years most of his researches were concerned with petrology and the distribution of the sources of the rarer minerals. To the end, however, he was interested in the purely scientific aspect of his work, and one of his last papers was on the microscopical structure of the Permo-Carboniferous fern-stem, *Psaronius brasiliensis*. He was ever ready to welcome and help other geologists who visited the country for special purposes, and in 1906 he co-operated with Prof. J. C. Branner, of Leland Stanford University, in producing a useful manual of elementary geology adapted for Brazilian students. Dr. Derby became a fellow of the Geological Society of London in 1884, and was awarded the Wollaston Donation Fund in 1892.

THE juvenile lectures of the Royal Society of Arts will be delivered by Prof. J. M. Thomson and Mr. J. Swinburne. Prof. Thomson will give the first lecture on January 5, his subject being "Crystallisation," and Mr. James Swinburne will give the second on January 12, upon "Science of Some Toys." Both lectures will be fully illustrated with experiments.

WE have received from Mr. F. W. FitzSimons, of the Port Elizabeth Museum, an abstract of his paper on the fossil human skull from Boskop (Transvaal), read before the meeting of the South African Association at Pretoria. It is essentially identical with his letter on the subject published in NATURE of August 15, 1915 (vol. xcv., p. 615), and indicates clearly that, although he emphasised the high state of mineralisation of the fossil, he had no intention of referring it to so remote a period as that of the Karoo reptiles.

THE President of the Board of Agriculture and Fisheries has appointed a Committee for the purpose of making such arrangements as are likely to ensure the fullest use being made of native resources in supplying existing demands for timber. The Committee is prepared to purchase standing timber and to make arrangements where necessary for felling, hauling, and conversion. All communications for the Committee should be addressed to the Secretary, Home Grown Timber Committee, Craven House, Northumberland Avenue, W.C.

ON Sunday evening, December 19, a great fall of chalk took place on the cliffs which overlook the picturesque Warren, near Folkestone, and it is reported that a considerable amount of damage has resulted. The South-Eastern Railway line, which runs along the foot of the cliffs, has been buried for a considerable distance under the débris, whilst the main road between Folkestone and Dover near the edge of the cliff exhibits long cracks about 4 in. wide, and heavy traffic has been stopped. Fortunately, no lives were lost, and although a house built only a few years ago on the face of the cliff was involved in the fall, the occupants luckily escaped. The fall is undoubtedly due to the recent spell of wet weather, and the explanation is simple. At this point the chalk dips inland at a low angle, but the various joint-planes which traverse the bedding at right angles emerge in the face of the cliff. The enlargement of these joints by the percolation of water weakens the overlying mass of chalk, which finally slips forward, and its detachment gives rise to the fan-shaped scar so characteristic of the cliffs in east Kent.

ON and after January 1, 1916, the following fees will be charged, in the interests of national economy, for admission to the Royal Botanic Gardens, Kew:—On Mondays, Wednesdays, Thursdays, Saturdays, Sundays, and Good Friday, *1d.*; on Tuesdays and Fridays, except Good Friday (students' days), *6d.*; a charge of *3d.* is made for the admission of photographic apparatus. Bath-chairs will be permitted to enter the gardens during public hours when the condition of the paths is suitable on payment of *1s.* on students' days (Tuesdays and Fridays, except Good Friday), and on payment of *6d.* on other days. Students' permits, available until the close of the calendar year, and obtainable on written application to the director by *bonâ-fide* students and artists, will be issued on payment of a fee of *5s.* These permits will cover free entrance on students' days and before public hours on week days, except Good Friday and Bank Holidays. Season tickets, available until the close of the calendar year, can be obtained on written application to the director on payment of a fee of *1l.* These tickets will cover admission on any day during public hours.

WE learn from *Science* that, at the request of President Wilson, the National Academy of Sciences has appointed the following to investigate and report on the control of the Panama land-slides:—President C. R. Van Hise, University of Wisconsin (chairman); General H. L. Abbott, Cambridge, Mass.; Dr. G. F. Becker, United States Geological Survey; Prof. J. C. Branner, Stanford University; Dr. Whitman Cross, United States Geological Survey; Dr. A. L. Day, Carnegie Institution; Dr. J. L. Hayford, Northwestern University; Prof. H. F. Reid, Johns Hopkins University; Dr R. S. Woodward, Carnegie Institution; C. Carpenter, Ithaca, N.Y.; A. P. Davis, United States Reclamation Service; J. R. Freeman, Providence, R.I.

WE notice that Dr. J. N. Rose, of the United States National Museum, and his assistant, Mr. Paul G. Russell, have recently returned from an extensive journey in Brazil and Argentina, where they have been engaged especially in making a collection of Cactaceæ from the South American desert regions. The expedition was undertaken in connection with the exhaustive study of the Cactaceæ of North and South America, which Dr. Rose is making for the Carnegie Institution of Washington. In addition to the extensive collection of herbarium material which has been brought to the National Museum, large collections of plants in a living condition were brought back and are now on exhibition in the New York Botanical Garden. The publication of Dr. Rose's results of his journey will be eagerly awaited, and cannot fail to be of as great interest and value as his former contributions to the desert botany of the United States.

A GENEROUS tribute to the memory of the late Prof. Meldola was paid, we learn from a report in the *Times*, by Lord Reading, the Lord Chief Justice, at a meeting of the Maccabean Society on December 14. Lord Reading said:—Humanity and science were both mourners and sufferers by the death of Prof. Meldola. No one whose life was not spent in science could have any conception of the varied aspects in which Prof. Meldola touched life and adorned it, and of the wide outlook which he had over the world. He was in every respect a most lovable man. Since the war, he had done much work for the Government, by whom it was highly valued. There must come eventually a period of reconstruction in the country, and when that time came we should miss the work which Prof. Meldola could have done. He had left a lasting memorial of himself in all his life, not least in the last part of his life.

FOREMOST in the equipment of the protagonist of airships is a plentiful supply of optimism; possibilities must perforce loom much larger than actual achievement when the latter is meagre. In an article entitled "Possibilities of the Large Airship," contributed to the *Fortnightly Review* for December, Mr. A. J. Liversedge does not trouble much over the technical difficulties of large airships, being concerned chiefly to prove that they are "worth while." In fact, he regards the construction of large semi-rigid dirigibles as being well within the capacity of borough engineers or surveyors, assisted by "woodworkers, handymen, and youths and female labour." "Plans, the necessary direction, and the finance would, of course, be provided by a central authority. . . ." Mr. Lloyd George would provide the engines through the Ministry of Munitions. We may believe in large airships and their usefulness both in war and peace, without visualising them coming quite in that fashion. It smacks too much of an article in one of the domestic periodicals describing how, with the aid of "a friendly carpenter," a packing-case becomes a sideboard or a wardrobe. Mr. Liversedge's optimism seems of the wrong sort, and his visions of the functions of airships in war somewhat awry, ignoring as they do in many cases the possibilities of easy destruction, by the enemy, of the airship. But to one who is so optimistic about their production, the loss of one or two would not perhaps matter.

THE collection of gem-stones formed by the late Sir Arthur H. Church has, in accordance with a wish expressed in his will, been presented by his widow to the trustees of the British Museum, and is now on exhibition in the recent addition case in the Mineral Gallery of the Natural History Museum at South Kensington. It comprises about two hundred selected and choice faceted stones, most of them mounted in gold rings, and the whole is of considerable intrinsic value. The stones are referable to twenty-one mineral species, so that, with the notable exception of diamonds, most of the species that have been used in jewelry are represented. The interest of the collection, however, lies more in the strong suites afforded by certain species, illustrating well the wide ranges of colour which may be exhibited by one and the same kind of stone. This is particularly the case with zircon, a mineral to which Sir Arthur Church had devoted much study, though unfortunately he had not completed his observations or prepared them for publication. Of this species there are sixty-nine faceted stones, ranging from colourless to various shades of red, brown, yellow, green, and even sky-blue. Other strong suites are of tourmaline, garnet (including a fine example of spessartite, the rare manganese-garnet), spinel, opal, corundum, chrysoberyl, and peridot. Examples of rarer species represented in the collection are phenakite, andalusite, and enstatite.

By means of a submerged chamber, provided with large glazed apertures and entered through a tube attached to the well of a specially constructed barge, the brothers G. and E. Williamson have devised a means whereby they can take kinematograph pictures of marine animals and make surveys of the ocean floor, down to a depth of as much as 30 fathoms. The complete success of their ingenious method was demonstrated at a private view, given on Tuesday afternoon, at the Philharmonic Hall, London, and the exhibition will be open to the public in a few days. Some remarkable pictures, taken in the Bahamas, were thrown on the screen, showing "snappers" and other fish which haunt coral reefs, divers gathering sponges, sharks attracted by a dead horse suspended in front of the observation chamber, and, finally, an encounter with a shark by one of the inventors of the apparatus. Pictures taken at night, by means of several Cooper-Hewitt mercury vapour lamps, were also shown. The inventors claim that their apparatus will enable treasure to be raised from vessels sunk in shallow water with far more ease than hitherto, since they have devised a means of pushing the arms through special apertures, enabling the diver to seize objects seen through the observation chamber. Another and very real advantage of this method of submarine work is that the operator is enabled to remain at work for long periods without suffering the discomforts inseparable from the ordinary means of diving. From a spectacular point of view it is to be hoped that the inventors will be able further to improve on their chamber, for it is distinctly distracting to see the floor of the ocean heaving to slow music while fishes of various bizarre shapes and colours disport themselves for our edification. This movement is at present inseparable from the rise and fall of the barge with the swell. If the chamber could rest on the bottom, by lengthening the tube, this motion would be avoided.

The director of the Meteorological Office informs us that during the last three months a number of auroras have been reported by Mr. G. A. Clarke, the observer at King's College, Aberdeen. His latest report on the subject refers to a fine display commencing about 6 p.m. on December 6, and lasting until after midnight. It seemed to attain its maximum between 8 p.m. and 10 p.m. About 9.30 p.m., according to Mr. Clarke's report, a very extensive and bright glow, topped by a narrow arch, stretched from N.E. right round to W. Above this arch at an elevation of 60° from the horizon were some streamers, and a series of very fine rapid pulsations of light of a pale green white to lavender or pale rose tint. The arch and glow were pale greenish, and gave sufficient light to form faint shadows of buildings, similar to what occurs in faint moonlight. This aurora was accompanied, as has been the case with most of the auroras reported recently by Mr. Clarke, by a good deal of magnetic disturbance. At Kew the curves were considerably disturbed during the whole afternoon of December 6, and up to 4 or 5 a.m. on December 7. The total range of declination was about 49′, and that of horizontal force about 170γ ($1\gamma = 1 \times 10^{-5}$ C.G.S.). The most outstanding declination movement at Kew took place between 9.55 and 11.40 p.m.; during this time the needle swung 28′ to the east, and returned practically to its original position. The most notable horizontal force change was a rise of 150γ between 10.20 and 10.45 p.m. These changes, it will be noticed, occurred somewhat later than the hour when the aurora at Aberdeen was most brilliant.

A useful popular account of fleas by Mr. F. C. Bishopp has been issued by the United States Department of Agriculture (Bulletin 248). The life-history of these familiar insect parasites is sketched, and their importance as carriers of bubonic plague and other diseases is duly emphasised. Practical measures for exterminating fleas and gaining protection from their attacks in infested localities are not forgotten; for example, a man sitting in a room inhabited by the insects is advised to wrap his legs with flypaper, or to wear khaki trousers and have them "tucked into high-top shoes."

A knowledge of the life-histories of the ecto-parasites of man is, at the present moment, of vital importance to us all, and especially to those of our countrymen who are on active military service. We are glad, therefore, to see in the Journal of the Royal Society of Arts the report of a lecture on this theme by Dr. A. E. Shipley, the master of Christ's College, Cambridge. Herein Dr. Shipley, in his own inimitable way, gives a brief account of the habits and habitats of the head and body louse, the flea, and the bed-bug, and the diseases spread by them. By way of illustrating the devious ways in which these pests extend their range, he remarks of Cimex, the bed-bug, that it was unknown to the aboriginal Indians of North America, and probably, therefore, "entered that continent with the 'best families' in the *Mayflower*"! Other disease-bearing insects, like mosquitoes, tsetse- and other biting-flies, house-flies, and bluebottles and other insects which spoil the food of man, like flour-moths and biscuit "weevils," are each in turn passed in review, and their ravages explained.

In the *Scottish Naturalist* for December Mr. A. Landsborough Thomson continues his notes on the Aberdeen University bird-marking scheme. We would suggest that where birds are recovered which were ringed as nestlings at the same time and place it would be helpful if it was stated whether they were nest-fellows. A case in point occurs in Mr. Thomson's notes. Two sheldrakes were ringed as nestlings at Beaulieu, Hampshire, in July, 1912; one was recovered at Saltash, Cornwall, in February, 1913, the other at Busum, in Schleswig-Holstein in August, 1913.

THAT closely similar and nearly related species may sometimes be more easily distinguishable by their behaviour than by their physical characteristics is shown by Mr. Walter Ritchie in the *Scottish Naturalist* for December, wherein he describes "The Smaller Pine Beetle (*Myelophilus minor*) in Aberdeenshire." *M. minor* and *M. piniperda* are two small bark-beetles, which are to be distinguished one from another only after very careful scrutiny. Yet the tunnels which they drive beneath the bark of trees are strikingly different in character, so that there can be no possible confusion in the plan of the mother and brood-galleries of the two species. The mother-gallery of *M. piniperda* forms a vertical shaft from which the very long larval galleries are given off on either side at right angles. In *M. minor* the mother-gallery is biradiate, and runs transversely to the long axis of the tree-trunk, while the larval-galleries are very short, and running at right angles to the mother-gallery. They thus come in consequence to run in the same direction as the mother-gallery of *M. piniperda.*

PARTS 10 (Series A and B) of the third volume of the *Review of Applied Entomology* have just been issued by our Imperial Bureau. Of special interest among the summaries of foreign literature are accounts of Prof. N. A. Cholodkovsky's latest work on the Chermesidæ (Dept. Agri., Petrograd, 1915), and if Dr. O. N. Paleitchuk's detailed instructions for the treatment of bees infected with *Nosema apis*. Unfortunately we are not told if the prescription, when adopted, proved effectual.

THE Consular Report (Annual Series, No. 5496, 1915) on San Thomé and Principe indicates the remarkable success achieved by the Portuguese authorities in their drastic measures taken to exterminate the tsetse-fly and sleeping sickness on these islands. The death-rate has fallen steadily, and in 1914 only 52 people died of the disease at Principe; only eight persons on the island were still suffering from it, and they were all old cases. The conquest of the epidemic has no doubt been due to the campaign against the tsetse-fly. None have been caught since April 11, 1914, although the reward has been raised from one to five dollars per fly. Thirty-four flies were caught in 1914. The report remarks:—"Apparently there is every reason to believe the fly has now been completely exterminated in the island."

THE Records of the Indian Museum, vol. xi., part 4, contains some valuable notes on Indian parasites of fish by Mr. T. Southwell. He is of opinion that some species at least of the larval Trematodes which live in the skin and flesh of fishes may mature in the human intestine. The ectoparasitic crustacean, *Argulus foliaceus,* he found to be a serious menace in confined tanks. This was demonstrated in the case of a number of Indian carp (*Labeo rohita*), which, about a month after being placed in the tank, became sluggish and floated on the top of the water. When removed they were found covered with Argulus. All the fish were then captured, scraped clean, and returned to the water. An upright bamboo was then placed in the centre of the tank, and this was immediately used by the fish as a mean of rubbing off their unwelcome adherents. No more deaths occurred after this date. It is unlikely that frogs assisted in keeping down this parasite, though the author inclines to this view.

ACCORDING to the theory of parallel axes, any quadratic function of the co-ordinates and their rates of change of a system of masses may be represented as the sum of two terms, one being the same as if the whole mass were concentrated at the centre of mass, and the other representing the corresponding function of the relative co-ordinates and their rates of change referred to the centre of mass as moving origin. Unfortunately, however, there has been a tendency in certain quarters to reproduce misstatements in which similar properties are alleged to hold good with regard to points other than the centre of gravity. Prof. E. Bidwell Wilson communicates to the American *Mathematical Monthly,* vol. xxii., No. 6, a note on "Linear Momentum, Angular Momentum, and Kinetic Energy," in which it is sought to enunciate the precise forms which these dynamical magnitudes assume when expressed in terms of the motion of an arbitrary point and of the relative motion of the system with respect to that point. It is desirable that these results should be studied in detail by teachers of mechanics, but it will be evident from a perusal of the paper that the student should be warned invariably to choose the centre of mass as the moving point with respect to which the dynamical magnitudes under consideration are expressed as the sum of two terms. We have seen it stated that in forming equations of motion it is only possible to take moments about either a fixed point, the centre of gravity, or the instantaneous centre in the case of small oscillations. As a matter of fact, moments may be taken about any point whatever provided that the mass accelerations of the system are properly specified in the form of a force through the centre of gravity and a couple.

THE Journal of the Washington Academy of Sciences for November 19 contains an abstract of a paper on the mechanical properties of zinc-bronze by Mr. H. S. Rawdon, of the Bureau of Standards, which will ultimately appear in full in the Bulletin of the Bureau. The alloy has the composition, copper 88, tin 10, and zinc 2 per cent., and considerable variation in the method of preparation may be made without the structure being seriously affected. In the cast condition it consists of a matrix of relatively large crystals of a solid solution of tin and possibly zinc in copper, in which are embedded numerous particles of a hard, brittle eutectoid. When broken in tension the fracture occurs along the cleavage planes of these crystals, and their size and relative positions in the cross section of a test bar have a considerable effect on its strength. The most serious cause of fracture is, however, the presence of oxides in the form of pits and films, and in almost all cases in which a test bar failed under a load less than 35,000 lb. per sq. in., the failure was traced to these oxides of tin and zinc.

AT the end of last year the important plumbago mining industry in Ceylon was suffering very severely from the loss of the German and Belgian markets and from other causes connected with the war, and steps were taken by the Imperial Institute to induce users of plumbago in the United Kingdom to buy the whole of their supplies from Ceylon instead of partly from Ceylon and partly from foreign countries as previously. Recent statistics indicate that progress has already been made in this direction, for it is significant that the percentage of Ceylon plumbago exported to the United Kingdom during the first ten months of the present year is considerably greater than in 1913. Moreover, the total exports to this country from January to October this year are more than double those of the corresponding months in 1914, and, in addition, Russia is a large new purchaser. The most important use of plumbago is in the manufacture of steel works crucibles, which are required to resist the effects of great variations of temperature; and it is gratifying to know that a source within the British Empire is available to supply the demands of our munitions works for these articles.

THE Cambridge University Press will publish very shortly a supplementary volume of Scientific Papers by Sir George Darwin. It will be edited by F. J. M. Stratton and J. Jackson, and contain lectures on Hill's lunar theory, a paper on periodic orbits, the inaugural lecture delivered in 1883 on the author's election to the Plumian professorship at Cambridge, and an address to the International Congress of Mathematicians in 1912. In addition, the volume will include memoirs of Sir George Darwin by, respectively, Sir Francis Darwin, on his life apart from his scientific work, and Prof. E. W. Brown on Darwin as astronomer, mathematician, and teacher.

OUR ASTRONOMICAL COLUMN.

o CETI.—The maximum of this star is not "due" until January 8, 1916, but strict regularity is not a feature of its light curve, and it has already reached 3·0 magnitude (December 16), being only slightly less than α Ceti (2·7 mag.), and is thus a full magnitude brighter than at the last maximum. The present apparition strongly recalls that of December, 1906.

COMET 1915*e* (TAYLOR).—Since this comet was observed at Washington many observers have managed to find it. An observation made with the 10-in. refractor at the Hill Observatory on Thursday, December 16, 13h., gave the following approximate position, R.A. 5h. 16·7m., declination +2° 13′, whence it appears that the daily movement is accelerating. As the comet is evidently approaching, increasing in brightness and very favourably placed for observation, it may be expected to become a fairly conspicuous object.

From observations made on December 6 at Washington, and on December 9 and 12 at Copenhagen, Messrs. Braae and Fischer-Petersen have calculated the following orbit and ephemeris:—

$$T = 1916 \text{ Feb. } 26{\cdot}426 \text{ t.m.B.}$$

$$\left.\begin{aligned} \omega &= 18^\circ\ 27'\ 38'' \\ \Omega &= 107^\circ\ 6'\ 55'' \\ i &= 21^\circ\ 52'\ 59'' \end{aligned}\right\} 1915{\cdot}0$$

$$\log q = 0{\cdot}19358$$

	R.A. h. m. s.	
Dec. 25 ...	5 11 1 ...	δ + 5° 7′·6
29 ...	8 34 ...	6 40·3
Jan. 2 ...	6 22 ...	8 21·8

The comet's distance from the sun diminishes from 172 to 160 million miles between December 13 and January 2, and it comes about ten million miles nearer the earth in the same time. On December 12 it is stated to have been of about the eleventh magnitude.

GEMINID METEOR SHOWER.—Mr. Denning sends the following notes of observations of this shower:—Mrs. Fiammetta Wilson, observing from Wokingham, on December 11, 6h. 30m., to midnight, saw thirty-seven meteors, of which nearly one-half were Geminids, from a radiant at 109°+32°. On December 11 thirty-two meteors were seen before midnight, and a very distinct radiant was found at 117°+31°.

Miss A. G. Cook observed the shower from Stowmarket on December 11 until interrupted by clouds at 10.30. The radiant was at 109°+33°.

Mr. T. Hargreaves, at Eton, watched for meteors on the evenings of December 11, 12, and 13, and morning of 14, and recorded forty , of which about eight, seen from 12h. 28m. to 13h. 16m. on December 13, were Geminids with a radiant at 111°+30°.

Mr. Denning, at Bristol, looked out on December 12, 15h. 30m. to 18h., and in about 1¾ hours of that interval saw twenty-five meteors, 18 per cent. of which were from a double radiant at 110°+33° and 118°+32°. Clouds prevented observation on December 13 and 14, but on December 15, 15h. 40m. to 16h. 10m., thirteen meteors were counted. Not a single Geminid was seen; the shower appeared to be over.

On December 15, 8h. 23m., a fireball was seen from Bristol falling low in due north, path about 207°+53° to 210°+47°. It must have been a splendid object from the north of England and south of Scotland.

Judging from the results of the foregoing and some other observations, it seems certain that the display was not above the normal character. Moonlight, however, partially interfered, and several cloudy nights at the most important period prevented efforts to corroborate the easterly motion of the radiant.

NOTES ON VARIABLE STARS.—A sudden maximum of UV Persei was observed by E. Hartwig (*Astronomische Nachrichten*, 4815) on September 2, the star reaching 11 mag., although less than 13–14 mag. on August 28. On September 4 it was again invisible. This fleeting illumination was also observed by Prof. A. A. Nijland (*Astronomische Nachrichten*, 4818), who reports that the star could not be found on August 31. On September 3 it was as bright as the comparison star, but the following night had vanished. The previous maximum occurred on June 19, 1914—*i.e.* 434 days earlier.

Some interest attaches to a new variable star, 4, 1915 Orionis (1900, 4h. 58m. 46s., −4° 20·8′), discovered by Mr. J. Voûte, who, seizing a fortuitous opportunity, observed it passing through an extraordinary fluctuation of light last September (*Astronomische Nachrichten*, 4821). Estimated magnitudes were:—

1915	Sept. 12	8·5 mag.	Sept. 28	7·12 mag.
	Sept. 23	6·4 mag.	Oct. 4	8·3 mag.

The variability of RU Cassiopeiæ and the neighbouring star, P.D. 695, was not supported by photographic measures recently published by Dr.